Space Weather Forecast

Issued on Friday, 24 June 2022 at 13:09 Local

This forecast provides a four-day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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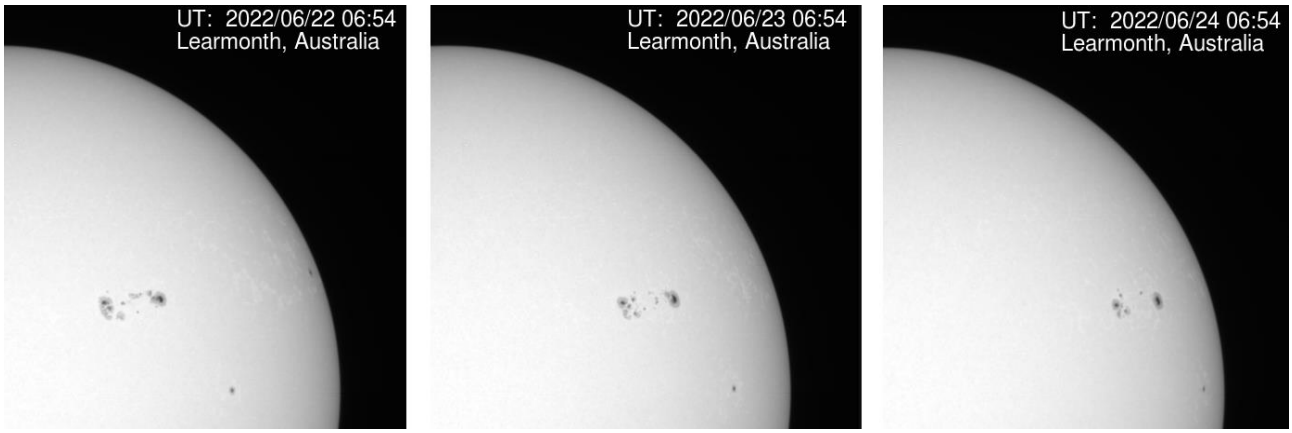
Space Weather Forecast Headline: Slight Chance of a moderate-class X-ray flare. Slight chance of G1/Minor Geomagnetic Storms, peaking Saturday 25 June.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Solar activity has remained low over the past 24 hours, with X-ray activity showing only middling common-class flares. These flares were occasional, peaking with a modest emission from the largest and nominally most complex region on the Sun at 23/2023UTC. There remain issues with the availability of some satellite imagery at present, however there appear to be four sunspots on the facing side at present. The aforementioned largest group in the northwest showed slight areal decay as well as the fading and migrating of its central spots in the 24 hours. In addition, its leading large spot became more symmetric, all traits that point towards decreasing complexity and a lower likelihood of flares. Otherwise, the remaining sunspot groups were all unremarkable.

Figure 1: Three days' images of northwestern solar sunspots with 24-hour cadence from Learmonth observatory (Australia), showing the decaying trend in the largest and most complex sunspot group. This trend may go some way toward explaining the observed lack of X-ray activity.



A large 'filament' (arc of plasma) occupying part of the northwestern quarter of the Sun was seen to become mobile around the UTC dawn period of 24 June, disappearing from ground-based telescope imagery between 24/0800 and 1000UTC. Satellite imagery of this event is awaited. Otherwise, analysis of front side potential Coronal Mass Ejection (CME)-causing events has been somewhat hampered in the past 36 hours or so, however there were a few weak CMEs observed. These have been modelled to the best that available imagery will allow, and currently none are thought to be Earth-directed.

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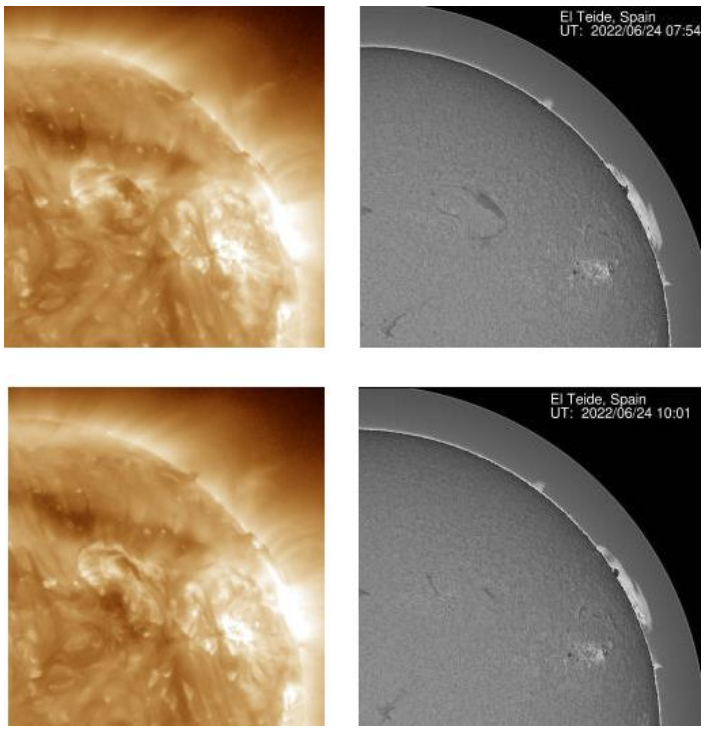

Figure 2: False-colour extreme UV satellite imagery and ground-based near infrared imagery of the northwestern quarter of the sun. This shows a 'disappearing filament' (compare 24/0800UTC (top) and 24/1000UTC (bottom)): specifically, the orange-brown images show dimming in the vicinity of the departure of the dark reverse-C-shaped filament in the right hand images. This is a recent candidate for an Earth-bound CME should it have left the immediate solar environment, with confirming imagery awaited.

Solar Wind / Geomagnetic Activity: The solar wind showed mature and weak potential 'coronal hole-like' influences, i.e. a decaying fast wind. The solar wind speed showed an erratic tendency within slightly elevated levels during the first half of the reporting period, with this evolving to a more decidedly downward trend through the UTC morning of Friday 24 June. The number of particles comprising the solar wind showed a gradual rising and then falling trend within its typical background range over the same interval, while the magnetic field peaked at slightly elevated values mid-period. The orientation of the magnetic field in the solar wind, which had been variable, became almost completely co-aligned with Earth's field from 23/2300UTC to limit subsequent geomagnetic activity. The net result of the above measures was quiet, well below Minor Storm G1 throughout.

Energetic Particles / Solar Radiation: No solar radiation storms were observed.

Four-Day Space Weather Forecast Summary

Solar Activity: Solar activity is likely to be low, with a daily slight chance of an isolated moderate-class flare. One sunspot dominates the Sun in terms of flare risk, and only leaves during day four (Monday 27 June). There are no significant returning regions over the eastern solar horizon that may have otherwise bolstered the expected decreasing flare risk trend towards the middle of next week.

Solar Wind / Geomagnetic Activity: No CMEs are currently thought likely to reach Earth. Up to three sources may provide the fast wind for elevated or perhaps strong wind speeds through the middle of the forecast period, most likely peaking early on day two (Saturday 25 June) with a slight chance of G1/Minor Storms. Activity is expected to revert to quiet by the end of the four-day period.

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Energetic Particles / Solar Radiation: No solar radiation storms are expected but with a daily slight chance of an S1 or greater event as a result of the large sunspot gradually nearing the better-connecting (with Earth) western limb.

Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	10	20	5	1
Strong	G3	No	1	1	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	No	20	20	20	20
Very Active	R3 to R5 X	No	5	5	5	5

Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ S1	No	5	5	5	5
Very Active	≥ S3 *	No	1	1	1	1
* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)						

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